ABSTRACT

Food shortage is a substantial threat to world today. There are many issues regarding conventional organic fertilizers that impact plants growth and environment adversely. Another issue that has detrimental impact on plants is heavy metal stress. Strategies to mitigate these effects and help in increasing plant growth parameters are underneath investigations. Nanotechnology is regarded as an excellent equipment in addressing numerous environmental concerns, as it provides innovative and workable solutions. An experiment was performed to determine ZnO NPs efficiency in foliar and soil mix application (15, 25 and 40 mg Kg^{-1}) on growth performance and antioxidant capacity of lettuce plant subjected to Pb stress. Effect of ZnO NPs was also estimated on microbial community of soil. It was compared with urea fertilizer. Application of ZnO NPs under normal circumstances, the Pb-induced loss was lessened and there was a notable increase in biomass. Chlorophyll content, shoot length, root length, fresh weight, dry weight and antioxidant enzymes attained maximum values at 40 mg L^{-1} in foliar application of ZnO NPs. Bacterial CFU/g did not have any significant difference from control group, however, fungal CFU/g decreased to some extent with increase of ZnO NPs and Pb stress did not have any significant difference from control group Soil respiration was reduced maximal at 25 mg Kg^{-1} + 50 mg Kg^{-1} Pb stress. qCO_2 was found to be highest at 25 mg Kg^{-1} + 50 mg Kg^{-1} Pb stress. These conclusions indicate that ZnO NPs can be a rational choice in dealing with Pb stress to lettuce plant.